VOL. XII. NO. 5.—BOTANICAL GAZETTE.—MAY, 1887.

Our "tripetalous" species of Iris.

SERENO WATSON.

A century has not been time enough for American botanists to become acquainted with two of the most peculiar of their species of Iris, to say nothing of other eastern species, which, after an even longer time, still remain only imperfectly known, some of them almost unknown.

In 1788 Walter described with unusual fullness his *I. tripetala*, of which nothing more was learned until the time of Elliott (1816). As there had been a prior *I. tripetala* of Thunberg, Walter's name was changed by Pursh to *I. tridentata*, but it was restored by Elliott, the African species having been transferred to *Moræa* some years before the date of Pursh's Flora, where it still remains. There is no reason why Walter's name should not hold good, in which case Pursh's falls wholly to the ground. Elliott knew the species only as growing in the ponds of St. John's and St. Stephen's parishes, South Carolina, where Walter had found it. Its range has since been extended from the low districts of North Carolina to Florida. The only figure that has been given of it is as *I. tridentata*, Pursh, in Sweet's British Flower Garden (1828), t. 274, from plants which had been recently introduced from North America and cultivated at the Fulham Nurseries. The figure is a very good one and answers closely to Walter's description.

In the next year there appeared in Curtis's Botanical Magazine (t. 2886) a figure, and a description by Sir W. J. Hooker, of an Iris under the name of *I. tripetala*, Walt., said to have been communicated by David Falconer from his collection at Carlowrie, Edinburg, but without indication of its original source. It is evidently a different plant from that figured by Sweet, and represents fairly, so far as the flower is concerned (but with broader leaves and much larger spathe), what we now know as a peculiar Canadian species. This Mr. Falconer, as appears from Loudon's Gardener's Magazine (1827), had in cultivation a very full collection of the known species of Iris and was endeavoring to make it complete. As there was frequent communication between England and Canada it is reasonable to suppose that this plant had been obtained by him directly from that province.

The discrepancy between the two figures, and between the plants in cultivation, was soon noticed, and in the same magazine for 1829 there is a note respecting an "*Iris Falconeriana*, Penny in Hort. Eps. ed. 2 ined.," named in compliment to Mr. Falconer of Carlowrie. "*I. tridentata*, Sweet, B. F. G. t. 274," is cited as a synonym, and it is said to be "very distinct from *I. tripetala*, Bot. Mag. t. 2886." The name must, therefore, have been intended for the Carolina form. George Penny was connected with the Epsom Nurseries; whether his Hortus Epsomensis, ed. 2, was ever published I do not know. He appears, however, to have not only given the above name to the species represented by Sweet's figure, but to have named the other also, for in Steudel's Nomenclator (1840) we find an "*I. Hookeri*, Penny," with "*I. tripetala*, Hook. in Bot. Mag. (non Walt.)" as a synonym, and "Am. Sept." as habitat. Granting the correctness of Steudel's reference to Penny as authority for the name, it is right that it should be adopted for the species and so credited, the citation being equivalent to a description, and sufficient for the identification of the plant to which the name was applied.

The first distinct statement of the occurrence of *I. Hookeri* in Canada is in Hooker's Flora Bor.-Americana (1839 or '40) as "I. tridentata, Ph.—*I. tripetala*, Walt. (not Thunb.) Bot. Mag. t. 2886. *Hab.* Canada. *Mrs. Sheppard.*" No doubt is expressed respecting its identity with Walter's species, but Herbert's notes cited under this species and under "*I. Caurina*" are to the effect that in his opinion *I. tridentata* is only an imperfect state of *I. Virginica* (*i. e.*, *I. versicolor*). Nothing more of moment was known or written about it until recently. In 1876 Mr. J. G. Baker of Kew wrote a revision of the genius for the Gardeners' Chronicle, in which he recognizes the two species as distinct. He retains Walter's species under his name, and transfers Pursh's name to the Canadian one, of which Pursh knew nothing whatever. He gives a description of this, not based apparently upon recent material, but chiefly upon the original figure and description. He compares it with *I. versicolor*, and suggests, with Herbert, that it may be a variety of that species. This resemblance to *I. versicolor* is much stronger in the figure, drawn from a probably luxuriant cultivated specimen, than in the wild ones which I have seen. In the Gray herbarium the species is represented by flowering specimens from Newfoundland (*Murray*), and by flowering and fruiting speci-

mens from the rocky and gravelly shores of the lower St. Lawrence at Tamisconato (*C. G. Pringle*). In these the leaves are nearly as narrow as in *I. prismatica* (2 to 4 lines broad), but the stems are low and rather stouter, and form a somewhat thicker rootstock. The pedicels (usually 2) are shorter than the scarious spathe, which is two inches long or less. The flowers, aside from the size and coloring, are distinguished by the short oblanceolate inner segments. The capsule is oblong and obtuse, rather thinly membranous and obtusely 3-lobed laterally, and distinctly marked by transverse veins. The seeds are scarcely more than half as large as those of *I. versicolor* and are more oblong. The rigid coriaceous capsules of *I. versicolor* are usually longer, rather acutely triangular, and with the obscure veins longitudinal, while in *I. prismatica* the capsules are strongly triquetrous and cross-veined.

I. tripetala is a taller and more leafy, slender and narrow-leaved species, with firmer herbaceous bracts enclosing the short pedicels. The capsules are coriaceous, broadly oblong, with a stout beak, and veinless. The seeds (not quite mature) are large and thick.

Attention having thus been called to this northern species, it is hoped that we may soon become better informed respecting its range through the lower provinces of Canada, and the variations to which it may be subject. There is also another point to which it may be well to advert. Both Herbert, in the Fl. Bor.-Am., and Mr. Baker, in his papers, are positive respecting the occurrence of the Californian *I. tenax* in Newfoundland and New Brunswick. It is not in itself probable, nor yet is it likely, that either *I. Hookeri* or *I. prismatica* could be mistaken for it, from both of which it is usually distinguished by the separation of the bracts which form the spathe. I would like to see a specimen of that species from the Atlantic coast. In conclusion I should express my obligations to Prof. Oliver and Mr. Hemsley of Kew for a clue to the personality of Steudel's "Penny," about whom I was completely at a loss.

Notes on Umbelliferæ of E. United States. IV.

JOHN M. COULTER AND J. N. ROSE.

(WITH PLATE IV.)

HYDROCOTYLE Tourn.—Fruit (and carpels) strongly flattened laterally, more or less orbicular: carpel with 5 primary ribs (additional secondary ones with reticulations in a single species); dorsal ribs marginal, broad or filiform; intermediate ribs filiform (rarely obsolete), usually curved; lateral ribs filiform or broad, distinct or confluent: a prominent oil-bearing layer beneath the epidermis (except in H. Americana), occasionally containing small oil ducts[1]: a thick layer of strengthening cells surrounding the seed cavity (except in H. ranunculoides) (figs. 43-56).—Low herbaceous perennials, growing in or near water, with slender creeping stems, orbicular-peltate or reniform leaves, and small white flowers in simple or proliferous umbels. Flowering all summer. In figure 44, *a* indicates the oil-bearing layer, *b* ordinary parenchyma, *c* the layer of strengthening cells.

* Fruit with pericarp thin except at the broad thick corky dorsal and lateral ribs (figures 43–50): leaves orbicular-peltate, crenate: peduncles as long as petioles, all from slender creeping rootstocks.

†† Fruit notched[2] at base and apex; intermediate ribs corky (figures 43–48).

1. **H. umbellata** L. Spec. 234. Umbels many-flowered, simple (sometimes proliferous): pedicels 2 to 6 lines long: fruit about 1½ lines broad, strongly notched (figs. 43, 44).—Massachusetts to Minnesota and southward to the Gulf.

2. **H. prolifera** Kellogg, Proc. Calif. Acad. i. 15. Umbels mostly proliferous, with 5 to 20-flowered whorls: pedicels 1 to 3 lines long: fruit about a line broad, but slightly notched (figs. 45, 46).—Texas, to Arizona and California. This species is too near H. umbellata. In the great majority of specimens they can be distinguished easily, but the occasional forms of H. prolifera which are not proliferous, and

[1] This character of a prominent oil-bearing layer differs from any other group yet studied. In the European H. vulgaris the oil-bearing layer breaks through the epidermis in places covering the fruit with oil vesicles.

[2] This notching may not be apparent except in fully matured fruit.

with many flowers and long pedicels, can be distinguished with difficulty. The fruit sections are but slightly different. If this is a good species, the following is a better one.

3. **H. Canbyi.** Umbels 3 to 9-flowered, generally proliferous: pedicels very short, but distinct: fruit about 2 lines broad; carpels broader and more flattened than in the preceding forms, sharper margined, dorsal and lateral ribs much more prominent; seed-section much narrower (figs. 47, 48). *H. umbellata* var? *ambigua* Gray, Manual, 190.—New Jersey to Maryland. It would be proper to call this species H. ambigua, but that name already has a place among the synonyms of Erigenia bulbosa.

The three foregoing species, with H. vulgaris of Europe, form a very natural group, closely resembling each other in the anatomical details of the fruit. H. vulgaris is most nearly related in external appearance to H. Canbyi, but differs in its smaller fruit more or less dotted with oil vesicles, its less flattened carpels, and less prominent dorsal and lateral ribs, thus intermediating between H. Canbyi and the first two species. There can be no doubt but that our three species are the North American representatives of H. vulgaris.

++Fruit not notched; intermediate ribs not corky (figs. 49, 50).

4. **H. interrupta** Muhl. Cat. 10. Umbels few-flowered, proliferous, forming an interrupted spike: pedicels very short or none: fruit 1½ to 2 lines broad: dorsal and lateral ribs very prominent (figs. 49, 50).—Massachusetts to Florida and Texas: also in Utah.

** Fruit with pericarp uniformly corky thickened and ribs all filiform (figs. 51-56): leaves not peltate: peduncles much shorter than petioles.

+Fruit small (¾ to 1½ lines broad), without secondary ribs or reticulations: involucral bracts small or wanting.

5. **H. Americana** L. Spec. 234. Stems filiform, branching and creeping: leaves thin, round-reniform, crenate-lobed and lobes crenate, shining: few-flowered umbels axillary and almost sessile: fruit less than a line broad; intermediate ribs prominent; no oil-bearing layer; seed-section broadly oval (figs. 51, 52).—Throughout the North and southward to North Carolina.

6. **H. ranunculoides** L. f. Suppl. 77. Usually floating: leaves thicker, round-reniform, 3 to 7-clett lobes crenate: peduncles 1 to 3 inches long, reflexed in fruit: capitate umbel

5 to 10-flowered: fruit 1 to 1½ lines broad; ribs rather obscure; no layer of strengthening cells about seed cavity: seed-section oblong (figs. 53, 54).—E. Pennsylvania to Florida, thence westward to Texas and California.

++Fruit larger, with prominent secondary ribs and reticulations: the 2 to 4-flowered umbel subtended by an involucre of two conspicuous bracts.

7. **H. Asiatica** L. Spec. 234. Petioles and peduncles (1 to 2 inches long) clustered on creeping stems or runners: leaves ovate-cordate, repand-toothed, thickish: fruit about 2 lines broad: seed-section narrowly oblong (figs. 55, 56). *H. repanda* Pers., Benth in Fl. Austral. iii. 347.—Maryland to Florida and westward.

EXPLANATION OF PLATE IV.—All surface views are × 15; all transverse sections are × 27.

Fertilization of Epipactis latifolia.

A. D. WEBSTER.

[It is not our custom to reprint articles, but a good contributor has made request for the following, on the plea of its interest, and the comparative inaccessibility of the original publication. It appears in the *Transactions and Proceedings of the Botanical Society* of Edinburgh, vol. xvi, part iii, 1886. The author is of Llandegai, Penrhyn.—EDS.]

Having during the past few years, but particularly the summer of 1885, devoted considerable attention to the above interesting subject, I have thought the following observations not unworthy of record, as contributing to a subject which, as yet, has received little investigation. In the woodlands of this county (Carnarvonshire), where the plant grows in unusual quantity, exceptional opportunities have been afforded me of studying it under various conditions as to soil, altitude, and situation.

All, or nearly all my observations tend to show (1) that *Epipactis latifolia* is very imperfectly fertilized; (2) that, although visited by insects, cross-fertilization seldom takes place; and (3) that self-fertilization by the pollen falling spontaneously on the stigma is not uncommon.

1. That the plant is very imperfectly fertilized is evident from the small quantity of seed produced. On examining

nearly one hundred plants when the seeds were ripe in October, I was surprised at the small number of capsules produced. (The ovules of unfertilized flowers drop from the plant at an early date, thus affording an unerring guide as to the difference between barren and well-filled capsules.)

I examined nineteen plants growing in consecutive order in one wood, and out of a possible 492 capsules only 38 produced seed. Thinking that perhaps the density of foliage or maritime situation might account for this unusually small production of seed, I examined the plant in quantity in two other warm, shady woodlands, but with almost similar results. Sixteen plants, growing within a short distance of each other, produced only 32 capsules from 516 flowers; while in another wood similarly situated 26 were produced out of a total of 215. This small production of seed, in an unusually fine season like that of 1885, clearly proves that *Epipactis latifolia* is very imperfectly fertilized, and, as will be seen hereafter, that cross-fertilization by insect agency seldom takes place. The conclusions naturally arrived at are, that this orchid is more frequently self than cross-fertilized, but when the small production of seed is taken into account, very imperfectly by either method.

2. That, although visited by insects, cross-fertilization seldom takes place, is proved by the following observations: Amongst insects of sufficient size to remove the pollinia that I have seen visiting the flowers of this *Epipactis*, I may mention the red-tailed humble bee and our common wasp, the latter, however, but very rarely. On the other hand, the red-tailed humble bee visits the flowers of this plant frequently, but, owing to its peculiar method of sipping the nectar without entering the flower, never removes the pollinia. On August 21, 1885, being in a wood where beds of this plant were in full flower, I saw the above bee enter several flowers on two different plants growing side by side, without in any case removing the pollinia. On the 24th of the same month, and in the same wood, I saw a red-tailed humble bee visit successively no less than sixteen flowers on a spike of this *Epipactis* without removing any of the pollinia. In this case the spike of flowers was so dense that the bee crawled from one to the other in a spiral fashion from bottom to top without once bringing its head or proboscis in contact with the viscid disc at the base of the pollinia. After sucking the nectar from the last flower, it flew off for a few yards, but immediately returned and revisited three of the

same flowers, but this time in a half discontented fashion, as if striving to improve on work that had been already well done. Again, on the 26th of the same month, I saw several visit the flowers of this plant (one visited most of the flowers on seven plants in succession) without removing the pollen, although, being near, I noticed them visit numerous flowers that contained the pollen masses. The bees hung on the distal portion of the labellum and inserted their long proboscis without the head coming in contact with the viscid disc. The evening was lovely, and I spent an hour watching the plants, but during that time, although wasps were flying about in number, not one visited a flower. (This certainly was the opposite of what I expected, as several naturalists are under the belief that this *Epipactis* is constantly fertilized by this insect, one indeed going so far as to say that if wasps were becoming extinct in any locality, so, in all probability, would *Epipactis latifolia*.) On other occasions, however, I did see the common wasp visit several flowers, but the visits were short, and, if I may use the expression, heartless, as if it could derive little therefrom. Owing to their long, narrow shape and short proboscis, wasps remove the pollen masses with ease, for I have caught them immediately after coming out of the flower with the pollinia attached to their head; but as these visits are few and far between, fertilization by this way is of rare occurrence. In numerous instances, also, the pollen masses will be found glued to the upper sepal of the flower, which is done as follows: The wasp on entering, particularly a newly-opened flower, gets the pollinia attached to its head when sucking the nectar; but immediately on entering another flower, the upper sepal is so situated that the sharp stiff edge comes in contact with the viscid substance, which, with the pollinia, is left attached to it. This, I have never seen take place, but repeated experiments bear out the statement. It is also readily illustrated with a pencil. In various other parts of the plants it is not uncommon to find the pollen masses attached as if the discs were not sufficiently viscid to retain their hold on the insect's head, and on more than one occasion I have found them unbroken, on their stigmatic surface. Small insects also visit the flowers in numbers, as I have watched them creeping about within the labellum and other parts; but in numerous instances many of those which come in contact with the viscid stigma are unable to free themselves, and so perish. The largest insect that I have seen killed in this way was $\frac{3}{16}$ of an inch in length.

When the plants begin to wither, or immediately after fertilization takes place, the distal portion of the labellum curves upwards, and effectually closes the entrance to the basal portion or nectary, but for what end I am unable to say.

3. That self-fertilization by the pollen falling spontaneously on the stigma is not uncommon. I have frequently observed that the pollen masses in a few days, or perhaps a week, after the flowers open become swollen, or the particles of pollen disunited so as to protrude slightly beyond the sharp upper edge of the stigma. At the same time, or later on, the pollen becomes remarkably friable, and before the plant withers, either spontaneously or by the action of the wind, falls on the stigma and other parts of the flower. The peculiar position of the pollen masses—hanging directly above the stigmatic surface—insures this the more readily. That the pollen masses become detached and fall apart is beyond dispute, as I have on many occasions found the grains scattered over the leaves, flower and stem of the plant, as well as, in one or two instances, noticed the pollen masses still within their cells, but with the corners broken off and lying on the stigmatic surface. This breaking up of the pollen masses may be spontaneous, but it is materially assisted by both wind and rain.

On examining numbers of the plant I have found it a general rule that the entire pollinia, or a large part of them, have not been removed from such flowers as bear well-filled capsules. Now, this of itself seems to me to indicate self-fertilization by particles of the pollen falling on the stigma, for it is quite evident that if wasps (the only insect, so far as is known, that in this country does fertilize the plant) visited and impregnated the flower they could hardly have avoided removing the pollinia. To make sure, I examined several withered flowers with swollen ovaries on different plants, and was surprised to find that in most cases remnants of the then musty pollen could be distinctly detected within the shriveled anther.

After reading the above remarks one is naturally led to ask: Why, if *Epipactis latifolia* is so imperfectly fertilized, is the plant so abundant?

This I can only answer as follows: (1) Nature, as if to make up for the small production of seed, has endowed this plant, unlike the generality of our native orchids, with special facilities for the perpetuation of its race. The original roots do not, as in most other orchids, die off annually, but

serve for collecting nutriment for the succeeding plant, the eye or bud of which is formed close to the old or last year's stem. At times the plant produces several of these eyes in one season; indeed, during the present summer I counted sixteen and twenty-six flowering stems on two plants, and it is not at all uncommon for three or four stems to be found attached to the same plant. (2) Each capsule (judging by the number in the almost equally sized *Cephalanthera grandiflora*) will contain about six thousand seeds; so that, even if one only were produced on each plant, it would be more than sufficient to keep up the stock.

In conclusion, one can not but wonder how remarkable it is that the nectar of *Epipactis latifolia* should be so highly attractive to the red-tailed humble-bee, that can not fertilize the flower; while to the wasp, that can remove the pollen masses with ease, and thereby insure cross-fertilization, it offers but little attraction, as is clearly shown by the almost total absence of its visits. I have mentioned above that, under certain conditions, the roots of this plant produce eyes or buds; but, strange as it may appear, this is not the case in all, for I have examined numbers without any such means of reproduction. In many instances, also—indeed, it is the general rule in this district—the plant in question is destitute of a rostellum, the viscid matter at the base of the pollinia being free or uncovered, thus imitating in structure the degraded and self-fertilized *Cephalanthera grandiflora*.

Now, can it be that *Epipactis latifolia*, from not being sufficiently attractive to insects, or from the want of proper insects in this country to fertilize it, is gradually becoming modified, and propagation by increase of the root slowly but surely taking the place of seed, or at least materially assisting to prevent the extinction of the plant, as would in all probability result from the present imperfect fertilization and subsequent small production of seed? This is rendered all the more probable by the curious fact that in most, if not all, of our native orchids that are either partially or wholly self-fertilized, nature, as if to make up for the small production of seed, has endowed them with special facilities for perpetuation, namely, by increase of the root.

Take the example of *Neottia nidus-avis*, which is very imperfectly cross-fertilized, but in which nearly all the rootlets produce young plants; also, that of *Epipactis latifolia*, which, under certain circumstances, behaves in a similar manner. Again, *Ophrys apifera*, which is, perhaps, the

most noted example of constant self-fertilization in British Orchideæ, is well known to appear and disappear somewhat mysteriously from certain localities by the young tubers increasing beneath ground until of a flowering size. *Cephalanthera grandiflora*, which is fertilized in the bud state by the emitting of tubes from the pollen grains, also increases by the root; but of this rare species I am able to give little original information.

BRIEFER ARTICLES.

Zannichellia palustris L. var. pedunculata.—In a rather remarkable pond, botanically speaking, this plant was observed as early as February 12, and was collected in full fruit March 19, 1887. The pond is formed by the waste water from a large blast furnace, and never freezes, so far as I can learn. A series of tests made when the weather was quite cool, ranging from 16° to 40° F., gave the temperature of the water from 76° to 82° F., and that of the sandy bottom from 80° to 90° F. In it Spirogyras and Zygnemas, Œdogonium and Vaucherias were found during all the winter months, in the vegetative state, at times in wonderful abundance, giving place at certain seasons to the profuse growth of Hydrodictyon. The pond is perhaps twenty feet wide by sixty long, and has never been visited when not completely filled with some of its habitués. At times our Spirogyras would all be Zygnemas. Again, both would give way to Œdogonium. Another day would show Hydrodictyon in full possession, with all the others crowded into the little bays and harbors of the pond. On April 23 I made a trip to the pond, and was surprised to find that Zannichellia had taken almost exclusive possession of nearly one-half its extent, and could be collected in all conditions from the beginning of its growth to the perfect fruiting stage. Its growth was as vigorous and its life apparently as happy as if had been flourishing in July, its proper fruiting month. Yet all about in other ponds were little films of ice, and the collectors were in winter overcoats.—STANLEY COULTER, *Terre Haute, Ind.*

Nymphæa lutea in Brazoria county, Texas.—In May, 1873, Mr. Wm. T. Horner, of Georgetown, Mass., then in Texas, while going from Galveston to Columbia, in crossing Oyster creek at a small place called Liverpool, saw what he thought were yellow pond lilies. He took a boat and went out on the creek to assure himself that he was not mistaken. He found them growing in deep water, the stems six or seven feet long. He sent a single specimen to Mrs. Horner. On his return to Georgetown, Mrs. Horner wrote to the only person Mr. Horner knew to get some of the roots. In the course of a few weeks they learned that this person was dead, and nothing more was done about it.—E. H. HITCHING.

Key to Forest Trees.—It was thought advisable to introduce for twelve weeks, daily, the study of botany into the Sophomore year of the mechanical course at Michigan Agricultural College. This is all the time the student is expected to give to botany, and even this is to be of practical value in the study of woody plants. The first five weeks were occupied in learning how to distinguish the trees of Michigan: mainly by a study of leaves, twigs, buds, outer bark, sections of wood, all aided by a simple microscope. No attention was paid to the flowers. To aid the memory the following artificial classification was devised, and it worked well:

A. *Leaves alternate and two-ranked.*
Basswood.
The Elms: American, Red and Rock.
Mulberry.
Hackberry.

B. *Leaves opposite.*
1. *Simple.*
The Maples: Sugar, Red and Silver.
2. *Pinnately compound.*
The Ashes: White, Black and Blue.

C. *Leaves five to eight ranked.*
1. *Simple.*
Whitewood.
Buttonwood.
Cherry.
Sassafras.
Birches: Yellow, Canoe and Cherry.
Poplars: Cottonwood, Aspen, Large-toothed Aspen.
Willows.
Oaks: White, Red, Black, Yellow, etc.
Chestnut.
Beech.
Ironwood.
2. *Compound.*
1. *Pinnate.*
Black Walnut.
Butternut.
Hickory: Shagbark, Pignut, Bitternut.
2. *More than once pinnate.*
Honey Locust.
Kentucky Coffee Tree.

D. *Conifers.*
1. *Deciduous.*
Larch.
2. *Evergreen.*
Pines: White, Red, Scrub.
Arbor Vitæ.
Spruces: Hemlock, Black, White, Balsam.
Cedar: Red, Juniper.

The other seven weeks were mainly occupied in the use of the compound microscope in the study of a few sorts of woods, as white oak, white ash, sugar maple, and white pine. Some attention was given to fungi acting on wood to produce decay; the different accidents which injure

trees; the effect on the appearance and durability of timber when cut in different directions. Each student wrote an essay on some topic in keeping with those above named.—W. J. BEAL, *Agricultural College, Michigan, March* 23, 1887.

Scoliopus Hallii Watson.—I collected this little Liliaceous plant last week in fine flower. As the floral characters have never been made out, it may be as well to record the following amended description:

Rhizoma very short or none: leaves oval-elliptical to narrowly lanceolate, at length 4–6 inches long, not brown punctate, sessile: pedicels (2–8) 4–6 inches long, slender: outer perianth segments lanceolate or oblanceolate, 3–4 lines long, a line and a half wide, narrowed to a claw below, yellowish green speckled with red outside, striped with dark purple inside, bent at a right angle in the middle so that the upper half is spreading or deflexed; the inner ones are linear-spatulate, shorter than the outer ones, not bent in the middle, but incurved and conivent over the stigmas: stamens 1–1½ lines long, about half as long as the red speckled ovary.—On Silver creek, about a mile above the town of Silverton, at the late Elihu Hall's original locality. In fine flower March 20.—THOMAS HOWELL.

Solidago bicolor L., and var. concolor Torr. & Gray.—While botanizing along the western side of the Green Mountains, in Vermont, last season (1886), I gave particular attention to the golden rods, and collected many interesting things; the most interesting being the above mentioned forms growing from the same root. I found *S. bicolor* L. very abundant, at middle elevations, but saw comparatively little of the var. *concolor*, except in the town of Ludlow, where both forms were in profusion. The remarkable specimen in question consisted of four stalks; two being typical white-rayed *bicolor*, and the other two being none the less typical yellow-rayed *concolor*.—F. H. KNOWLTON, *Washington, D. C. March* 31, 1887.

How humblebees extract nectar from Mertensia Virginica DC.—In the October number of the GAZETTE I recorded an observation of the manner in which humblebees extract the sweets from the flowers of *Physostegia Virginana* Benth. without entering the corollas, by making a slit at the base with the mandibles. In the April number Mr. G. von Ingen records a similar observation in regard to the common *Petunias*. To-day I observed a similar habit on *Mertensia Virginica* DC. It appears that the insect is well up to the work of splitting corollas; it is done quickly and easily, and if the old slit, made at the former visit, is not easily found, a new one is made. I found corollas that had as many as three parallel slits near the base. As this is near the beginning of the botanizing season, it would be well if botanists generally would keep this in mind, and at the end of the season record their notes. We might thus learn how general this habit is. It would add to the interest if the insects, thus engaged, were captured, and their specific names published with the notes. —J. SCHNECK, *Mt. Carmel, Ill.*

EDITORIAL.

THE MEETING of the A. A. A. S. in New York City next summer will give botanists a privilege that they will much prize. The Botanical Club will, in a certain sense, be the guests of the Torrey Botanical Club, and under the guidance of that well-organized body everything of botanical interest that is within reach will be laid tributary to the entertainment of the club. The Torrey herbarium, the Meisner collection, and all the other riches of the Columbia College collections will be objects of great interest. The salt marshes, the sea beaches, the New Jersey collecting grounds, all offer attractions and easily accessible fields. The greatest attraction, however, should be the presence of botanists from all parts of the country. The social pleasures of such a meeting, the stimulus to more and better work which comes from it, are simply incalculable. We bespeak the largest attendance of botanists that has yet graced the meetings of the Association—botanists who have come prepared to give as well as to receive, and who will take a prominent part in the work of the biological section as well as in that of the club. How the improbability of obtaining special rates in these days of interstate commerce law will affect the attendance from the west remains to be seen, but it will probably seriously interfere with it.

MR. J. B. ELLIS, in a recent number of the *Journal of Mycology*, has criticised the wording of the title of Professor Scribner's paper on black rot, read before the Botanical Club of the A. A. A. S and published in the GAZETTE for last November, because the name of the fungus Physalospora Bidwellii is credited solely to Dr. Saccardo, whereas the species was originally described by Mr. Ellis as a member of the genus Sphæria. Mr. Ellis contends that in changing the species to another genus his name should still have been retained as authority, either with or without being included in a parenthesis, whether the name of Saccardo were added or not, and in support of this view cites the usage of Drs. Winter, Cooke and Fries. Dr. Roumeguère has a note on the matter in the last *Revue Mycologique*, in which he expresses his disapproval of "the incorrectly abbreviated form" used by Professor Scribner, but is not willing to subscribe in full to the views of Mr. Ellis. There is much diversity of opinion and usage touching the subject, and support can be found for both sides of the present question; but we think the form *P. Bidwellii* (Ellis) Sacc. would receive nearly universal approval, although many would consider it equally satisfactory to omit one or the other authority.

OPEN LETTERS.

Raising Diatoms.

In reference to your kind words in the April GAZETTE, on my "Raising Diatoms in the Laboratory," I would have been further gratified had the fact been noticed of my experiments of passing the spores through filter paper, that they antedated the experiments of Mr. F. Kitton fully two years. How much of time and care these experiments cost me will never be known. As to your remarks on the March number of the *New York Microscopical Journal*, that its leading articles seem addressed to amateurs, this is in part true of the article which occupies the most space, my lecture, "The Life of a Diatom." The audience was chiefly composed of the families and friends of the members, but unfortunately the part which chiefly interested the members could not be given in print. It was illustrated with the lime-light, and a set of new photographs that would have delighted any botanist, Habirshaw's photograph of Pleurosigma, was shown to an audience, with lines a third of an inch thick and beautifully clear. Besides other nice points, a feature of which no mention is made in the printed lecture was the exhibit of lantern slides of Mr. Christian's new and very curious diatoms. As pictures these interested all, but their scientific side could only be seen by the diatomist. This much seems due from me to whom so much space was generously given in the *Journal*, and which could only present it as popular matter.

SAMUEL LOCKWOOD.

Freehold, N. J.

Antidote for Cicuta poisoning.

A case came under my observation of a young man who, while suffering from thirst in the hayfield, chewed the root of what he thought was spikenard, Aralia racemosa. In less than two hours he became extremely sick. The first sensation experienced was like a stroke on the head, with unconsciousness for a few seconds, followed by sickening nausea. Upon reaching home the mother suspected he had made a mistake in the plant, and not daring to wait to send several miles for a physician she procured a stalk of Eupatorium perfoliatum, made a tea of it, and gave freely as warm as could be taken. This assisted nature to relieve the stomach and caused a warmth and moisture of the whole system. In an hour the dangerous symptoms had disappeared. It was discovered that he had chewed and swallowed the juice of more than half of a four ounce root of Cicuta maculata. The physicians who afterwards saw the amount of the root which he had taken were surprised at the result.

Harmonsburg, Pa. J. E. WHITESIDE.

Autumnal blooming of Oxalis.

On the 18th of last September, while out on a little excursion along the B. & M. railroad near here, I found quite a patch of Oxalis violacea in full bloom by the side of the track. The individual flowers were a little above the ordinary size and several in a cluster, the whole plant seeming to be exceedingly vigorous. However, the strangeness of this freak of autumnal blooming was perhaps equaled by the fact that there was not a

single leaf on the hundred or so plants scattered for some distance along the railroad. The top soil had lately been removed by the section hands and these plants were growing on the south side of the track where the sun shone fairly upon them. Could this removal of the soil, and consequent bringing of the scaly bulbs nearer the surface have induced this very premature blooming? Or could any of the readers of the GAZETTE offer any other explanation in connection with the location of the plants? I expect to keep a watch over these plants this spring to see what they do when the ordinary time for blooming comes.

Hastings, Neb. HARVEY THOMSON.

Solidago erecta PURSH.

The herbarium of the United States National Museum has for distribution a good number of duplicates of the above species, which has recently been reinstated by Dr. Gray [Proc. Am. Acad. XXII, p. 308]. This form, so well represented in the District of Columbia, has been variously referred by Dr. Gray to *S. bicolor* L., var. *concolor* Torr. & Gray, and *S. speciosa* Nutt., var. *angustata* Torr. & Gray, and may have been so distributed from here, but its distinctness from either of these forms has long been recognized by many Washington botanists. F. H. KNOWLTON.

Assistant Curator Botany, U. S. Nat. Mus.

An aid in description.

In writing out descriptions it is important to have in mind the range of variations in the size of each organ. With microscopic objects this requires great familiarity with the specimens. A single figure, while it may be typical, can not show the range of variation. As an aid in making up descriptions, and to use for reference, tables like the following, which can be quickly made, have been found convenient. The vertical columns show the length in lines of each organ, while the horizontal rows show at a glance the amount of their variation. Other points can, of course, be added on the same plan, and the number of recorded observations be increased as circumstances require.

Muhlenbergia argentea Vasey. Palmer, Mexico, 1885, No. 160.

Lower empty glume	1½	1½	1⅝	1¼	1
Upper empty glume	1⅝	1½	1½	1⅜	1¼
Flowering glume	1¾	1⅝	1½	1⅜	1⅜
Palet	2	1¾	1⅝	1½	1⅜
Awn of flowering glume	5	5	4	2½	2

A. A. CROZIER.

Dep't Agriculture, Washington, D. C.

Exploration of San Domingo.

Baron Eggers has been engaged by the undersigned, and under the patronage of the Royal Academy of Sciences at Berlin, to undertake a journey of botanical research in the higher mountain regions of San Domingo that have not yet been explored. The plants to be collected will be distributed in two series with corresponding numbers. The first series will embrace only such plants as have not already been distributed in Eggers' *Flora Indiæ occidentalis exsicc.*, and will cost forty marks per

hundred. The second (and larger) series will omit only the ubiquitous tropical species, especially those of the sea coast, and will cost thirty marks per hundred. The determinations will be elaborated by the undersigned, assisted by various monographers. He will be pleased to receive subscriptions to either series, but without prepayment. In view of the difficulties of transportation in the island, only a limited number of sets will be collected; and a prompt notification is requested from those who wish to subscribe. DR. IGN. URBAN.

Friedenau bei Berlin, Germany.

A new lichen.

In 1886 I found a peculiar lichen on rocks in Catawba River. I sent it to Dr. J. W. Eckfeldt, of Philadelphia, and he to Mr. H. Willey, of New Bedford. The latter called it an Opegrapha. Lately I sent Mr. Willey better plants than he had seen, and he says it is not an Opegrapha, and has named it *Buellia Catawbensis*, n. sp. He gives the following description: Thallus thickish, squamulose, peltate, orbicular, about $\frac{1}{4}$ inch in diameter (I should say from $\frac{1}{8}$ to $\frac{3}{8}$), sub-entire, white, beneath black and naked: apothecia innate-superficial, the disk even with the thallus, black, at length crowded and confluent in the center of the thallus: hypothecium black, the proper exciple deficient: paraphyses distinct, agglutinate: spores oblong-ellipsoid, 2-loc., brown, .015-18 mm. by .007-8 mm.—On rocks along Catawba River Landsford, S. C., *Prof. H. A. Green*, 1886. A singular plant without near affinity. Taken from "Introduction to the Study of Lichens," by H. Willey. H. A. GREEN.

Chester, S. C.

CURRENT LITERATURE.

Physiological Botany: An abridgement of the student's guide to structural, morphological and physiological botany, by Robert Bentley, F. L. S. Prepared as a sequel to "Descriptive Botany," by Eliza A. Youmans. pp. xiv, 292. New York: D. Appleton & Co. 1886.

If any single term is to be used for this book, it should be *structural* rather than physiological botany, for it deals mostly with anatomy, less than one-third being devoted to physiology. We can not see that it is properly a sequel to Miss Youmans' "Descriptive Botany," for, with the exception of the impracticable "popular flora" of that work, this one covers much the same ground. It is a book of the old style, a compendious mass of facts, essential and trivial, about structure and function, condensed to the last degree, and therefore more useful as a book of reference than as a text book. Viewed in that light, it has not been improved by abridgment. It is of the "old style," in that it has no open questions. Its dictum, *ex cathedra* alike on fact and hypothesis, leaves the student no reason to doubt that all questions are forever settled.

With the structural part we have little fault to find, except with the illustrations, which are very uneven in quality; a few good, the majority only tolerable, and some very poor. The statements are in the main

accurate, and in this it excels its predecessor. The physiological part of the book is of the least value. It is not entirely reliable, nor up to the date at which it was written (1883), if we may judge fairly by the abridgment. The treatment of assimilation, respiration and fertilization may be pointed out as especially weak, though it is difficult to get at the first two topics because of the illogical way in which the subject is presented. The author devotes a section each to the functions of the various sorts of cells, the nutritive organs, and the whole plant. As the functions of the whole plant depend entirely on the functions of its organs, and ultimately on the functions of the cells, we can not see the advantage of such a method. It involves much repetition and dissociation of allied topics.

Altogether the book is a compact text book, with no special excellences and some serious faults. It is no better and no worse than the common run of school books. There *is* a need for a small text book suitable for high schools and lower college classes, but this does not meet it. The book that does must present the essentials of botany clearly and attractively, without the encumbrance of trivial details, and with constant recognition of the biological significance of structure and function. Who will write it?

Sylloge Fungorum Omnium Hucusque Cognitorum. Digessit P. A. Saccardo. Volume iv, Hyphomycetes. Padova, 1886. Roy. 8°. pp. 808.

One can scarcely accord too much praise to the author of the series of works of which this is the fourth volume, for his untiring devotion to botanical science as shown especially in this monumental undertaking. The number of described species of fungi is very large, embracing a large proportion of cosmopolitan or widely distributed forms. To bring together the works containing the original descriptions is well nigh impossible to the ordinary student of fungi; and to have these descriptions collated, systematically and critically arranged, and issued in handy volumes is a service that the mycologist will appreciate, the more work he does.

The author has not hesitated to take the most difficult classes first, those in which assistance is most needed. The present volume includes forms of superficial growth, having conidial spores borne free upon aerial branches. Although this grouping makes a convenient classification for the purpose in hand, it brings together orders of very unequal grade, which in many instances have but slight relationship. The majority of the forms are undoubtedly to be set down as *fungi imperfecti*, whose real standing can not be fully determined until their life history is better understood; some of them, however, have had their sexual condition well worked out, and in a more natural system of classification could find a more appropriate place elsewhere.

In a work of this kind one is not surprised to find such slips as the insertion of *Ramularia Astragali* Ell. & Hol. twice, once under Ramularia

(p. 202) and once under Didymaria (p. 184), each with an independent translation of the characterization, but this detracts little from the general accuracy of the volume, and less yet from its serviceableness.

Grasses of North America for Farmers and Students. By W. J. Beal, Professor of Botany in Michigan Agricultural College. Published by the author, 8°., pp. xiii, 457. 1887. Price $2.50.

Profesor Beal is so well known as a teacher of botany that he does not need introduction to botanists by means of a book. In this volume, which is intended chiefly for farmers, he endeavors to put the subject in such a way as to inform his readers of the general structure of those forms of plant life in which they are so vitally interested. Chapters on the structure, form and development of the grasses, power of motion, plant growth, classification, native grazing lands, grasses for cultivation, early attempts to cultivate grasses, testing seeds, grasses for pastures and meadows, preparation of the soil, care of grass lands, etc., put the farmer in a fair way to cultivate his grass lands intelligently. Prof. A. J. Cook contributes a chapter on insects injurious to grasses and clovers, and Prof. William Trelease writes of the injurious fungi. Mr. F. L. Scribner has contributed much to the value of the work in his excellent drawings. This volume can not help being greatly useful to the farming community, while the promised second volume will be of no less interest to botanists, as it is to contain descriptions of all known grasses of North America, with illustrations of at least one species in each genus.

Microscopy for Beginners, or Common Objects from the Ponds and Ditches. By Alfred C. Stokes, M. D., pp. xiii, 297. New York: Harper & Brothers, 1887.

This delightfully written book comes to a place almost unoccupied among American publications. Its chief object is to aid the uninstructed owner of a microscope first, to an intelligent use of the instrument; second, to the identification of the common aquatic objects; finally, and *most important of all*, it seeks to point out unoccupied fields and stimulate to the persistent study of some special subject. Many persons possessed of a microscope have almost ruined it before they found out how to use it, and many others have been at a loss to know what they saw when water from some stagnant pool swarming with living organisms was examined. This book will do much to help the novice to the names of aquatic organisms, and the name once known, the search after information more extended than this guide could furnish can be intelligently prosecuted. It is to be hoped that every one who buys a microscope for his amusement will buy also this book and that he will be led by it to see that *he* can add to the sum of knowledge if he will only single out some group of organisms for steady work. We have no patience with that "microscopy" which occupies itself with looking at gold-plated diatoms and with making "beautiful mounts" of "triple-stained vegetable sections,"

caring not for structure if they are only "handsome!" Let the microscope be a tool for earnest study—not the plaything of an idle hour!

The book is amply illustrated with useful, though small, drawings—not pictures—and contains many helpful artificial keys to genera and species, with references to standard works of more special character. It deserves a large sale.

NOTES AND NEWS.

M. PHILIBERT describes a new Bryum, B. Corbieri from northwestern France in the *Revue Bryologique* No. 2, 1887.

DR. ALBERT KELLOGG, the veteran botanist of the Pacific slope, died March 31st, at Alameda, California, at the age of seventy-four years.

AN AMATEUR botanical club has recently been formed at Washington with a membership of about twenty-five. Miss Flora N. Vasey is secretary.

IN THE *Revue Bryologique* No. 2, 1887, Dr. S. O. Lindberg describes three new species of Hepaticæ from Portugal, Marsupella profunda, Anthoceros constans and A. multilobulus.

A YOUNG Italian mycologist, the Abbe Ben. Scortechini, an explorer of Australia and further India, died a short time ago at Calcutta. A genus of fungi commemorates his services.

THE AMERICAN ASSOCIATION for the Advancement of Science will meet in New York City, beginning August 10. It will probably be interestingly warm in the city at that date, but the sea beach is near.

DR. DIDRIK FERDINAND DIDRICHSEN, seventy-two years of age, died on March 19. He was professor of botany in the University of Copenhagen from 1875 to 1885, and for thirty years previous held important botanical offices.

THE CORNELL BOTANICAL CLUB, of Chenango County, New York, has recently been organized, with F. V. Coville as president. It is the direct outgrowth of the enthusiasm in the study of the flora of Central New York, emanating from Cornell University.

MR. A. P. MORGAN, in continuation of his "Mycologic Flora of the Miami Valley, Ohio," has just distributed a paper on Hydnei. The seven genera are represented as follows: Hydnum 30 species (one new), Irpex 6, Radulum 3, Phlebia 3, Grandinia 1, Odontia 2, Kneiffia 1.

ONE OF THE rarest and least known mosses of Europe, Didymodon subalpinus, has lately been collected in Switzerland, on the Rigi, at an altitude of 1,400 meters, by MM. Van den Broeck and Dens. Heretofore it has been known only from a small specimen without a capsule in the herbarium of De Notaris.

PROFESSOR PENHALLOW, of Montreal, has issued a quarto memoir, reprinted from the Transactions of the Royal Society of Canada, on "Mechanism of movement in Cucurbita, Vitis, and Robinia." The memoir puts into final form the work already recorded by the author in the *American Journal of Science*, under the title "Tendril movements in Cucurbita maxima and C. Pepo," with some additional notes on the tendrils of Cucurbitaceæ.

THE ITALIAN JOURNAL OF BOTANY for April contains an account of experiments on the parasitism of *Agaricus melleus* Vahl, by L. Savastano; a new species of Tecoma (*T. Ricasoliana*), by E. Tanfani; some Venetian Diatomaceæ, Cyanophyceæ, and Chlorophyceæ, by G. B. de Toni and David Levi; and Flora of Otranto, by Enrico Groves.

AT A RECENT meeting of the Linnæan Society Sir John Lubbock, among other phytological observations, accounted for the peculiar shape of Liriodendron leaves by the manner in which the young leaves are packed in the bud. He affirms that the peculiar arrangement of the young leaves will satisfactorily account for the remarkable form of the leaf.

THE FIFTH *livraison* of Husnot's *Muscologia Gallica* has been issued. It contains descriptions and figures of the species of Grimmia (continued from part four), Rhacomitrium, Hedwigia, Coscinodon, Ptychomitrium, Glyphomitrium, Amphoridium, Zygodon, Ulota, and the first five species of Orthotrichum. The illustrations are lithographed by the author, and are improving. The difficult genus Orthotrichum is being specially elaborated by Dr. Venturi.

PROF. N. S. SHALER presents a thoughtful, instructive and well illustrated article upon the forests of North America in the May number of *Scribner's Magazine*. He considers the rôle of the forests in geological periods, the factors which have determined the relative abundance of different species, the relation to moisture precipitation, the production and maintenance of soils, the supply of timber, and many other questions of scientific, economic and general interest.

IN A PAPER before the Physiological Society of Berlin, February 25, Prof. Kronecker and Fräulein Rink reported an investigation which demonstrated that in peptone solution two kinds of bacteria are developed in the presence of air: Bacillus restituens, which transformed the peptone into serous albumen, exactly in the same way as did the living mucous membrane of the stomach; and Bacillus virescens, which liquified the alimentary gelatine and imparted a deep blue coloring to all sterilized substrata when exposed to the air. This latter bacillus operated poisonously on the heart.

M. THEOPHILE DURAND, sub-curator of the herbarium of the Brussels Botanic Garden, has prepared an index to the three volumes of Bentham and Hooker's *Genera Plantarum*, comprising the names of the genera, the principal synonyms, and the number and geographical distribution of the species. The genera are numbered consecutively, and arranged alphabetically as well as systematically. Such a work will be of vast service in herbaria and libraries. The subscription price is twenty francs, and application should be made to M. Durand, at the Botanic Garden, Brussels.

DR. C. C. PARRY has just distributed a short paper on "The Pacific Coast Alders," reprinted from *Bull. Calif. Acad. Sci.* ii., 7, and points out the value and importance of correcting systematic descriptions by careful and intelligent field observations. There can be no doubt that many descriptions are faulty, when made only from dried specimens, in the very points that a study of the living forms would correct. It may be said that such evanescent characters could hardly be of use in classification, which, after all, must be done mostly in the herbarium; but the question is not so much what characters we can preserve as what are the relationships of plants as shown by all sorts of characters, the best of

which may only be recorded in field observations. Hence, this disposition to study plants *in situ* can not be too highly commended. In the case before us, by this sort of study, Dr. Parry is convinced that the four species of alder enumerated in the Botany of California must be reduced to the earliest described species, *Alnus rhombifolia* Nutt. It is, by the way, a more encouraging sign when open air study combines species than when it multiplies them in a way that no herbarium student can follow.

Miss J. E. Whiteside, of Harmonsburg, Pa., writes: "Last season a rose bush which for ten years past has borne double roses, took a strange freak. The two central stalks produced an abundance of large-petaled, perfect, single blossoms, while the outer stalks continued the usual double ones. It evidently was a reversion to the parent, which possibly had been Rosa Carolina, as the single blossoms were in clusters. The double ones were borne singly. The bush stood in a situation where it received a great deal of water, and that may have caused it to revert, as the blossoms and leaves both pointed to a healthy condition of the plant."

Dr. Lucien M. Underwood, of Syracuse University, with the assistance of Mr. O. J. Cook, is actively engaged in getting together material for issuing sets of Exsiccatæ of the Hepaticæ. The series will commence with an issue of two decades, illustrating at least nineteen genera and, if possible, all four orders. These decades will be issued at a reasonable price in order that they may be obtained by beginners in the study of Hepaticæ, for whose help they are specially intended. It is hoped to have these sets ready this summer. Subsequent issues will illustrate rarer forms so far as they can be obtained. We are glad to be able to announce so important an undertaking and wish the projectors abundant success. They will be glad to have the assistance and co-operation of botanists. At present a supply of *Riccia* and *Anthoceros* is specially desired.

The Proceedings of the Edinburgh Botanical Society, vol. xvi, part iii, just distributed, contains the following articles of general interest: A forest tour in Provence and the Cevennes, by Major F. Bailey; Fertilization of Epipactis latifolia, and growth and fertilization of Cypripedium Calceolus, by A. D. Webster; Method of transmitting living plants abroad, by Robert Lindsay; Adaptation of Albuca to insect fertilization, by John Wilson; Certain properties of rosewood and other hard woods, by A. Galletly; Inflorescence, floral structure, and fertilization of Scrophularia aquatica and S. nodosa, by T. W. Fulton; Marine Algæ of Joppa (County of Mid-Lothian), by Geo. W. Traill; Nature and cause of variation in plants, by Patrick Geddes; Distribution of marine algæ of Firth of Forth, by John Rattray; Certain points in the morphology of Frullania, etc., by Prof. Alexander Dickson.

Mr. Ralph Sydney Smith has published an earnest appeal for the preservation of a Redwood park north of Santa Cruz. In remarking upon this important subject, Dr. Gray (*American Journal of Science*) says: "If nothing is done to preserve for posterity a specimen of Redwood forest, including if possible some of the large trees, future and not far distant generations of Californians will have cause to revile the memory of their forefathers. Time was when we had hoped for a government reservation of such forest, of ten miles square, in the northwestern part of the state, and it would have cost nothing. But the plan now broached, although it will cost something, has the great advantage of fairly securing this object and at the same time giving to San Francisco an unrivaled

park quite within reach of its citizens. Let us hope that the few great Redwoods which survive above Santa Cruz may form an annex to this reservation. Unless something of this kind is speedily done, one of the peculiar glories of the state of California will in the next century be only a tradition."

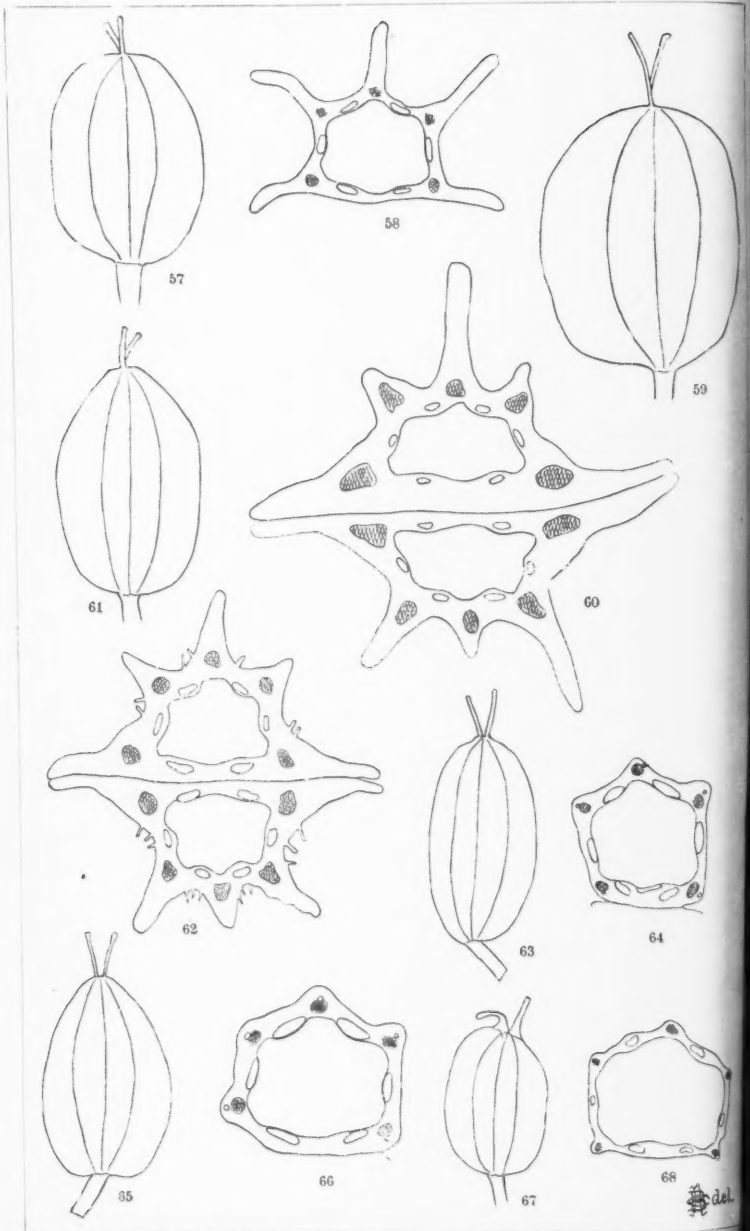
DR. MAXWELL T. MASTERS has just distributed his paper "On the floral conformation of the genus Cypripedium," as a reprint from the *Linnean Society's Journal*, vol. xxii, pp. 402–422. After speaking of the general conformation of orchid flowers, he takes up the conformation in Cypripedium. This is followed by an account of the distribution of the vascular bundles, and then the main part of the paper is taken up with the teratology of Cypripedium. Only those cases are considered which "directly elucidate the plan of orchid-structure." These malformations are grouped under the heads of defect, excess, or perversion of the natural process of development, using the following terms: oligomery (a dimerous condition being the commonest), pleiomery (usually increased lips or stamens), partition (in which primarily simple organs become divided by fission), displacement, and peloria (tendency towards regularity).

PROF. A. B. SEYMOUR has just distributed as a reprint from the *American Horticultural Report*, a paper on "Orchard Rusts," which contains an interesting account of the Gymnosparangium-Roestelia forms. The paper is written in reply to complaints of injury to fruits in various localities. The condensed life history of these forms is very pleasantly and plainly put in these words: "These fungi have two distinct forms and two distinct phases of development, which occur on two very different kinds of plants, and would at first appear to have no connection whatever. But investigations have proved that each stage of growth in turn comes from the growth of the spores of the other stage. This is called alternation of generations. The rust upon apples develops through the summer, and toward autumn produces spores, which are carried to the cedar tree. Here they germinate and produce a different form of the fungus, which begins its growth in the fall, lives through the winter and matures in the spring, expanding into conspicuous, yellow, jelly-like masses. The spores now formed are carried in the air to the apple tree, or some tree of that group, where they produce the apple rust or quince rust, as the case may be."

THE *Gardener's Chronicle* (April 23) says that Mr. W. Sayer, an emissary of the Botanical Department of Victoria, presided over by Baron Sir Ferdinand von Mueller, accompanied by an English tourist—Mr. Alexander Davidson—succeeded lately in ascending Mount Bellenden-Ker, the highest mountain in tropical Australia. They had to cut their track for many miles through dense jungles of virgin forest, and they had previously to encounter the hostility of the savages. Two cataracts of considerable magnitude were discovered during the ascent. This mountain has a particular horticultural interest, it having been named at the suggestion of Robert Brown (like Mount Dryander), during Flinders' expedition, in honor of a botanist—Mr. Bellenden-Ker, the great investigator of iridaceous and amaryllideous plants in the early part of the century. When, in 1855, Baron Mueller went with Mr. Aug. Gregory to Northwest Australia (where then what now is so famous as the Kimberley country was discovered), he saw from the sea, he tells us, the bold outlines of Mount Bellenden-Ker, towering to 5,000 feet, and could well appreciate the feelings which prompted Robert Brown to suggest a botanical name for that mountain; indeed, unexpectedly, it has proved the only one in

all tropical Australia which has a really cool zone. In a discourse given at the School of Mines in Ballarat, and on some other public occasions, the baron pointed out many years ago that, if any Rhododendron, Vaccinium, Quercus, Impatiens, Begonia and other plants of the cooler Malayan regions existed at all in Australia, it would be on the almost constantly clouded and temperate heights of Mount Bellenden-Ker. This anticipation has now been verified as regards the two first mentioned genera, a Rhododendron (R. Lochæ, allied to R. Javanicum) and a Vaccinium of the section Agapetes having been discovered at an altitude of about 5,000 feet, where they are strangely associated with a new arborescent Dracophyllum, a Spiræanthemum, a new Argophyllum, and other extra Indian types of vegetation specifically here endemic. New genera for Australia from the same high region are, also, a Didymocarpus, a Pentapanax; besides these were obtained new species of Helicia, Tristania, Morinda, Eugenia, Fagodea, and some others. The remarkable manner in which the Malayan and Australian plants meet others of New Caledonian type on the summit of Mount Bellenden-Ker (among the Australian being such typical forms as Trochocarpa and Arites) renders this high, though not extensive, region singularly remarkable for phytogeography. A new undescribed Proteaceous genus occurs, we are told, lower down on the range, and should, on account of its many large seeds, prove a new tropical nut tree.

In noticing in the *American Journal of Science*, Warming's "Entomophilous Flowers in Arctic Regions," Dr. Gray remarks: "Greenland is very poor in insects, especially of insects which perform an important part in the fertilization of the entomophilous blossoms of northern regions generally. Dr. Warming undertook a careful comparative study of these northern flowers, to learn whether those in Greenland were identical in floral biology with the same species in Europe. In many no differences were found, but in not a few certain modifications were detected in the Greenland flowers which rendered them more adapted to self-fertilization than those of the same species on the European continent, where the appropriate visiting insects are more abundant. In answer to the question whether the attractiveness of these blossoms for insects remain unaltered in Greenland, Dr. Warming is able to state that with three or four exceptions, the nectar secretions seemed not to be diminished; but that the odors were feebler, the size of corolla less, and the colors not so vivid as in the same species on the continent. As the entomophilous flowers of Greenland manifest an increased adaptation to self-fertilization, it might have been expected that the dioecious or polygamous tendency of some of them would disappear, but it proved not to be so. But the Salices were found to be remarkably fruitful, and it seems that they had become anemophilous."



COULTER and ROSE on UMBELLIFERÆ.

59

del.